

Considerations regarding the factors that monitor cold cracking of welded joints

Considerații asupra factorilor care monitorizează fisurarea la rece a îmbinărilor sudate

V. Micloși¹⁾, H. Dașcău²⁾

¹⁾Romanian Welding Society – ASR, Romania;

²⁾National R&D Institute for Welding and Material Testing – ISIM Timișoara, Romania

E-mail: viorel.miclosi@yahoo.com; dascau@isim.ro

Abstract

The paper analyzes the factors that govern the hydrogen induced cracking (HIC), namely the concentration of hydrogen, materials structure, mechanical stress field, to which time and temperature should be affected and underlines the synergistic action of these factors.

It highlighted the discrepancy between current HIC theories, which refer to the local concentration of hydrogen at the nano and micrometer and the practical evaluation that refers to the presence macroscopic average concentration of hydrogen.

We detail multiple causes that resulted in a very uneven distribution of hydrogen in welding, at micro, nanoscale or millimetric scale.

An analysis of the indicator H_{D100MD} was realised and its disadvantages are highlighted.

We proposed to evaluate the quality of filler material by resorting to the $H_{T100gMD}$ estimator by dividing the total hydrogen (remanent plus diffusible) to 100 g deposited material.

In order to estimate the HIC risk it is the rational use of the indicator $H_{T100gMC}$ obtained by dividing the total hydrogen per 100 g of material of the welded joint (filler metal plus molten parent metal).

Further researches are also proposed.

Keywords

Cold cracking, welded joint, hydrogen induced cracking, HIC, diffusible hydrogen, hydrogen distribution.